METHOD OF MAKING HIGH TEMPERATURE RESISTANT MODELS OR TOOLS

Election/Restrictions

1. Applicant's election with traverse of claims 14-21 and 27 in the reply filed on Sep. 26, 2008, is acknowledged. The traversal is on the ground(s) that simultaneous examination of the distinct inventions does not impose an undue burden of examination. This is not found persuasive because the divergent subject matter of the inventions of Group I (claims 14-21 and 27), Group II (claims 22-27), and Group III (claim 28) requires different fields of search and consideration of different prior art. Group I, drawn to a method of building and covering an assembly of substrates, is classified in class 156, subclass 280, while Group II, drawn to a method of mixing and applying paste to a substructure, is classified in class 366, subclass 184, and has no recitation of the assembly of substrates of Group I. Group III, meanwhile, is drawn not to a process at al but to a curable composition, classified in class 523, subclass 428. Simultaneous search and consideration of these distinct inventions constitutes an undue burden of examination.

The requirement is still deemed proper and is therefore made FINAL.

Claim Rejections—35 USC §103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

> invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 14 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsumoto et al. (EP 0 662 380).

Regarding claim 14, Matsumoto et al. teach a method of producing a mold (i.e., a tool) comprising: (a) building an assembly 3' of substrates (model blocks 3) by stacking model blocks 3 and adhering them with layers of a heat-resistant adhesive paste such as epoxy resins; (b) machining the assembly 3' of substrates; (c) covering the outer surface of the assembly of substrates with a continuous layer 5 of curable paste (hardening resin such as a heat-resistant epoxy resin); and (d) hardening (i.e., curing) the curable paste to produce the tool (Fig. 1(b), 1(c), 2(a), 2(b); col. 1, L. 1-8; col. 6, L. 18-23, L. 27-33, L. 50-58; col. 7, L. 1-2, L. 4-14; col. 8, L. 22-35; col. 9, L. 1-15).

Matsumoto et al. do not explicitly disclose that the composition of the curable paste of step (c) is the same as the composition of at least one of the layers of adhesive paste of step (a). However, Matsumoto et al. teach using a heat-resistant epoxy resin for both the adhesive paste of step (a) and the curable paste of step (c) (col. 6, L. 27-30, L. 53-56; col. 9, L. 13-15). One of ordinary skill in the art would have found it obvious to use the same heat-resistant epoxy resin in both step (a) and step (c) of the method of Matsumoto et al., given that Matsumoto et al. make no further limitations on suitable compositions for the pastes used in these steps.

Regarding claim 16, Matsumoto et al. teach a stack assembly 3' of substrates 3 adhered with several intermediate layers of adhesive paste (Fig. 1(c); col. 6, L. 27-33).

4. Claims 15 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsumoto et al. as applied to claims 14 and 16 above, and further in view of Hayes et al. (US 6,077,886) and Winter (US 3,861,936).

Regarding claim 15, Matsumoto et al. are silent as to the manner of dispensing the curable paste. However, it is known in the prior art to dispense by machine (e.g., when applying at a high rate or in a particular extruded cross-section) curable epoxy resins used as adhesives and encapsulants, as evidenced by Hayes et al. (col. 1, L. 3-14, L. 38-47; col. 4, L. 33-38; col. 5, L. 48-50; col. 6, L. 17-20), and in particular to machine-dispense epoxy resins used in making tooling models, as evidenced by Winter (Abstract; Fig. 1, 2; col. 1, L. 4-11), such that it would have been obvious to one of ordinary skill in the art to machine-dispense the curable paste in step (c) of Matsumoto et al.

Regarding claim 27, Matsumoto et al. teach a method of producing a tool comprising: (a) building an assembly 3' of substrates 3 by assembling and adhering substrates 3 to each other with layers of a heat-resistant epoxy resin adhesive paste; and (b) covering the outer surface of the assembly 3' with a continuous layer 5 of a heat-resistant epoxy resin curable paste, as described in paragraph 3 above. Although Matsumoto et al. are silent as to the manner of application of the pastes, it would have been obvious to one of ordinary skill in the art to machine-dispense the curable paste in light of the teachings of Hayes et al. and Winter. Further, Hayes et al. teach that a composition including epoxy resin, amine hardener, and a polyethyleneimine compound provides a curable adhesive or sealant with excellent non-slump properties, i.e.,

resistance to deformation before curing (col. 1, L. 3-10; col. 2, L. 24-40; col. 4, L. 33-42), so that it would have been obvious to one of ordinary skill in the art to apply the composition of Hayes et al. as the curable paste of Matsumoto et al. One of ordinary skill in the art would have found it obvious to use the same composition of curable paste in step (b) as for the adhesive paste of step (a), given that Matsumoto et al. teach that a heat-resistant epoxy resin is suitable for both pastes.

5. Claims 17, 18, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsumoto et al. as applied to claims 14 and 16 above, and further in view of Hayes et al.

Regarding claims 17 and 20, Matsumoto et al. teach that the adhesive paste and curable paste are both suitably made from epoxy resins (col. 6, L. 27-30, L. 53-55). Curable epoxy compositions in general are made by combining at least two separate components including an epoxy resin and a curing/hardening agent, and it is well known to machine mix these separate components to ensure their thorough blending when preparing epoxy adhesives and sealants, as evidenced by Hayes et al. (col. 1, L. 11-14, L. 38-44), so that it would have been obvious to one of ordinary skill in the art to form the adhesive paste and curable paste of Matsumoto et al. by machine mixing at least a separate epoxy component and a hardener component.

Regarding claim 18, it is further well known to provide curable epoxy resin-based adhesives and sealants with thixotropic agents to provide them with non-slump

properties in order to prevent them from undesirably losing their shape before curing, as evidenced by Matsumoto et al. (col. 1, L. 19-34; col. 2, L. 24-29), such that one of ordinary skill in the art would have found it obvious to include a thixotropic agent in the epoxy resin adhesive paste and curable paste of Matsumoto et al. to avoid slump therein.

6. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Matsumoto et al. as applied to claims 14 and 16 above, and further in view of any one of Hayes et al., Mariaggi et al. (US 5,817,737), or Young (US 3,652,486).

Matsumoto et al. teach using curable epoxy resins for the adhesive paste and curable paste, as described in paragraph 3 above, but are silent as to the overall composition or properties of these pastes. However, it is conventional to include one or more solvents or diluents in curable epoxy resin compositions in order to lower the dynamic viscosity thereof and improve mixing of the components, where the selection of the desired viscosity is within the level of ordinary skill in the art, as evidenced by Hayes et al. (col. 2, L. 41-46, L. 55-60), Mariaggi et al. (col. 1, L. 6-11; col. 4, L. 30-33), and Young (col. 3, L. 46-66). Hence, it would have been obvious to one of ordinary skill in the art to formulate the adhesive paste and curable paste of Matsumoto et al. to have a dynamic viscosity equal to or less than 10,000 mPa s measured at 25°C.

7. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Matsumoto et al. as applied to claims 14 and 16 above, and further in view of Wanthal et al. (US 6,060,540).

Matsumoto et al. teach using curable epoxy resins for the adhesive paste and curable paste, as described in paragraph 3 above, but are silent as to the overall composition or properties of these pastes. However, it is well known in the prior art to provide curable epoxy resin systems comprising an epoxy resin component and a curing/hardening agent in a latent form, where the latent hardener reacts slowly upon normal mixing and storage of the system, but can be activated, e.g., by heating, to quickly cure the system when desired, as evidenced by Wanthal et al. (col. 1, L. 46-52; col.2, L. 30-45; col. 3, L. 3-4; col. 4, L. 35-40). Thus it would have been obvious to one of ordinary skill in the art to use a curable epoxy resin and a latent or semi-latent hardener component in the curable paste of Matsumoto et al., because such compositions are well known as curable epoxy systems resistant to premature curing.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BRIAN R. SLAWSKI whose telephone number is (571)270-3855. The examiner can normally be reached on Monday to Thursday, 7:30 a.m. to 5:00 p.m. ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Crispino, can be reached on (571) 272-1226. The fax phone

number for the organization where this application or proceeding is assigned is 571-273-8300.

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/Brian R. Slawski/
Examiner, Art Unit 1791

/Jeff H. Aftergut/
Primary Examiner, Art Unit 1791

B.R.S.